



Catalog
HA 25.72 ·
2025

MEDIUM-VOLTAGE SWITCHGEAR

Circuit-Breaker Switchgear **Type NXAIR H**
up to 36 kV, up to 31.5 kA, Air-Insulated

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SIEMENS

Application

Typical applications



NXAIR H circuit-breaker switchgear is used in transformer and switching substations, mainly at the primary distribution level, e.g.:

Application:

Public power supply

- Power supply companies
- Energy producers
- System operators.



Application: Industry

- Power stations
- Cement industry
- Iron and steel works
- Rolling mills
- Mining industry
- Textile, paper and food industries
- Chemical industry
- Petroleum industry
- Pipeline installations
- Electrochemical plants
- Diesel power plants
- Emergency power supply installations
- Traction power supplies
- Airports
- Wind parks.



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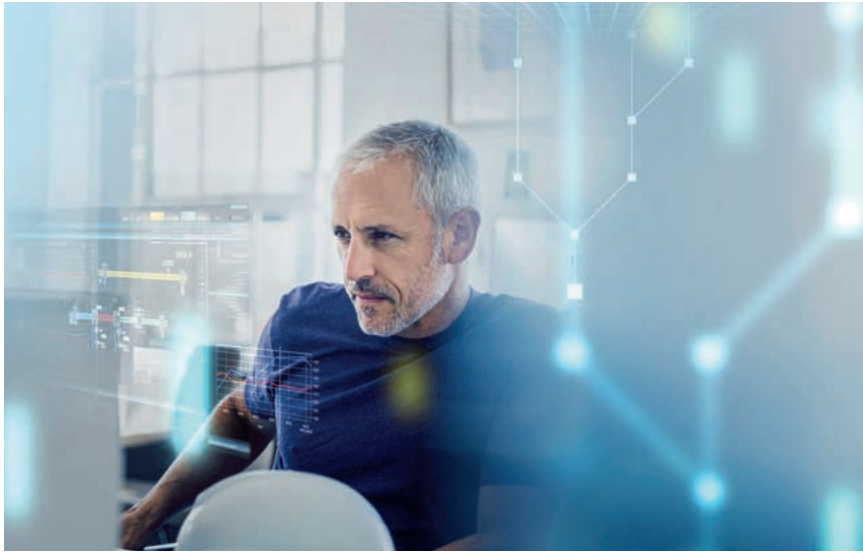
Standards

Standards, specifications, guidelines 25

The products and systems described in this catalog are
manufactured and sold according to a certified management
system (acc. to ISO 9001, ISO 14001 and BS OHSAS 18001).

Customer benefits

Ensures peace of mind



Ensures peace of mind

For power supply companies and industrial plants, the certification of the NXAIR H according to the latest standards has very concrete advantages: smooth operation, exemplary availability, and maximum safety.

Features

- No handling of insulating gas and no pressure monitoring required
- As insulating medium, air is always available
- Factory-assembled, type-tested switchgear according to IEC 62271-200
- Platform concept introduced worldwide, centrally controlled development, local manufacture
- Use of standard components available worldwide, locally manufactured components, considering regional standards
- Use of maintenance-free vacuum circuit-breakers
- Type testing of the main switching devices and the make-proof earthing switch in the panel
- Flexibility regarding the low-voltage equipment (removable compartment, plug-in wires)
- Quality assurance in accordance with DIN EN ISO 9001.

Customer benefits

Saves lives

Saves lives

NXAIR H is approved with internal arc classification IAC A FLR, loss of service continuity category LSC 2B, and partition class PM. This makes it suitable for universal installation, meeting the highest requirements regarding personal safety.

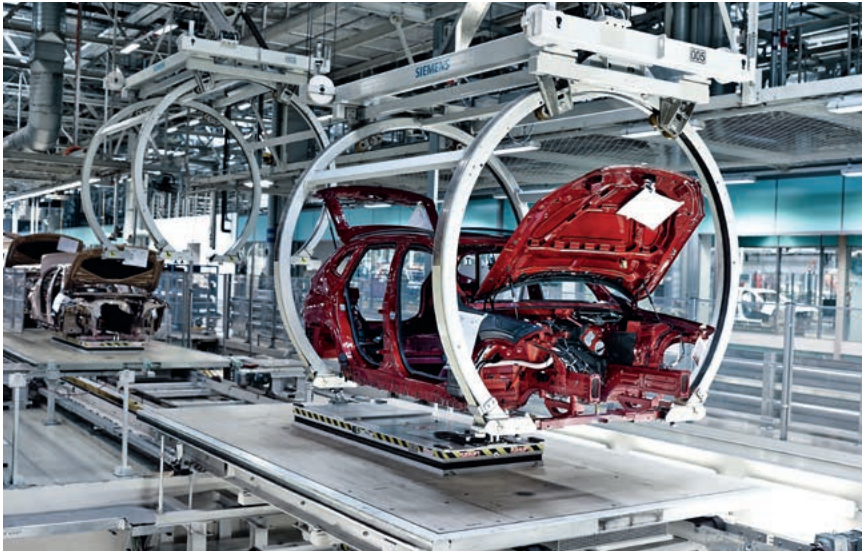


Features

- All operations with closed high-voltage door
- Metallic enclosure, earthed shutters and partitions
- Internal arc classified switchgear according to IAC A FLR (front, lateral and rear accessibility) for all short-circuit currents and an arc duration of 1 s
- Loss of service continuity category LSC 2B (separate partitioning of the busbar, connection and switching-device compartments)
- Partition class PM (metal partition)
- Clear switch position indicators and control elements on the high-voltage door
- Use of maintenance-free vacuum circuit-breakers
- Standard degree of protection IP4X
- Logical mechanical interlocking system.

Customer benefits

Increases productivity



Increases productivity

Use of metallic, earthed shutters and partitions between the compartments ensures maximum service continuity of the switchgear during maintenance.

Features

- Loss of service continuity category LSC 2B
- Partition class PM (metal partition)
- Maximum degree of protection IP4X
- Cable testing without isolating the busbar
- Functions such as establishment of the isolating distance, as well as feeder and busbar earthing, can be completely controlled from remote
- Use of maintenance-free vacuum circuit-breakers
- Control cables in metallic wiring ducts
- Rapid interruption of an internal arc optionally possible by installation of arc detection systems.

Customer benefits

Saves money

Saves money

Thanks to the use of the new SION circuit-breaker 3AE5 series, the cost-efficient design pays twice for owners. On the one hand, building costs can be reduced, and on the other hand, the maintenance-free circuit-breakers and the modular design enable continuous operation without expensive shutdown times.



Features

- Use of maintenance-free vacuum circuit-breakers
- Maintenance-free within up to 10 years
- Interruption of operation reduced to a minimum by logical mechanical interlocking system
- Minimized space requirements (reduced building investments) due to compact design and flexible pressure relief duct system.

Customer benefits

Preserves the environment



Preserves the environment

Air used as insulating medium, local production locations with short transportation ways and times, as well as a service life of more than 30 years, optimize the total energy balance.

Features

- As insulating medium, air is absolutely neutral to the environment
- Service life of more than 30 years optimizes the energy balance additionally
- The materials used are fully recyclable without special knowledge
- Easy disposal.



NXAIR H: A sustainable investment for today and tomorrow

At Siemens, we believe in sustainable development that meets current needs without compromising the future.

Siemens supports sustainability with a customized program, our “DEGREE framework”. Our DEGREE framework guides our efforts in six crucial areas of action that drive sustainability and continuously evolve.

Decarbonization: Support the 1.5 °C target to fight global warming

Ethics: Foster a culture of trust, adhere to ethical standards, and handle data with care

Governance: Apply state-of-the-art systems for effective and responsible business conduct

Resource efficiency: Achieve circularity and dematerialization

Equity: Foster diversity, inclusion, and community development to create a sense of belonging

Employability: Enable our people to stay resilient and relevant in a permanently changing environment.

Air-insulated medium-voltage switchgear NXAIR H is a prime example for our commitment to sustainability. Decades of experience have made **NXAIR H** a leader in **resource efficiency and decarbonization:**

- Use of natural air as insulating medium and vacuum interrupters for switching
- Free of all materials harming the environment (e.g., asbestos, mercury, SF₆ gas or other F-gases)

- Easily recyclable and reusable thanks to the use of homogenous material
- Use of maintenance-free vacuum circuit-breakers, and 10-year maintenance intervals for the switchgear
- Long product lifetime and serviceable life of more than 30 years
- Safe spare part supply over a period of minimum 10 years after phase-out
- Short transportation routes to customers thanks to global manufacturing network
- Global service network close to the customer
- Possibility for remote factory acceptance tests (FAT) and remote support for commissioning, service and maintenance
- Upgradable with condition monitoring systems for predictive maintenance
- Continuous improvement of durability by means of simulation software for development, testing and production based on the corresponding international standards and design directives.

Sustainability

NXAIR H: A sustainable investment for today and tomorrow



NXAIR H: A sustainable investment for today and tomorrow

Low-power instrument transformers (aka. NCITs) support making our switchgear even more sustainable. In the use phase, they help to reduce energy consumption and CO₂ emissions, as well as operating costs.

Additionally, we as Siemens commit ourselves to comply with all legal provisions and regulations like REACH, the Minamata Convention, the Responsible Minerals Initiative, as well as the Stockholm Convention consequently to ensure a sustainable future for all.

For NXAIR H, Life Cycle Assessments (LCA) are performed, and Environmental Product Declarations (EPD) for reference installations are available.

With its environmentally friendly design, resource-efficient production, and long-lasting performance, NXAIR H is the ideal solution for your power supply.

NXAIR – Enjoy the Air

Explanations:

REACH (Registration, Evaluation, Authorization and Restriction of Chemicals)

REACH - Regulation (EC) 1907/2006 is the European Chemicals Regulation concerning the registration, evaluation, authorization and restriction of chemicals. It has been in force since 2007 and replaces 40 individual laws.

The REACH Regulation is considered to be one of the world's most stringent chemicals laws.

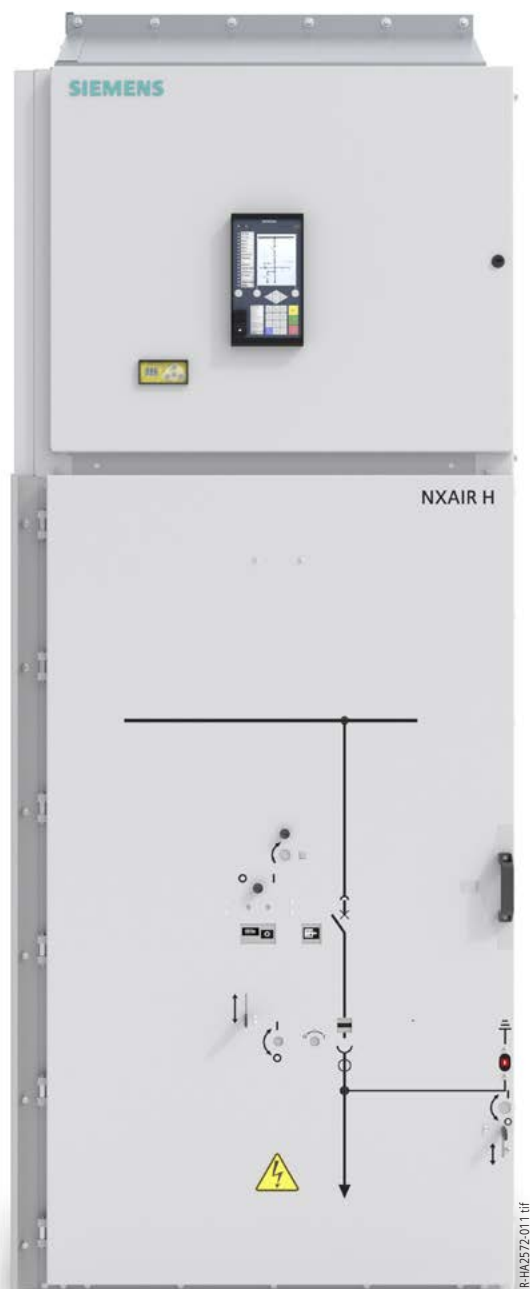
Environmental Product Declaration (EPD)

An Environmental Product Declaration (EPD) is used to provide the customer with information about the "ecological

footprint" of a product. Siemens has a clearly formulated strategy for the development of EPDs. EPDs are based on independently verified data from life cycle assessments, life cycle inventory analyses, or information modules, which comply with the ISO 14040 series of standards.

Life Cycle Assessments (LCA)

We use Life Cycle Assessments (LCA) to help us calculate the ecological footprint of our products and systems over their entire life cycle. Siemens follows the strict requirements of the ISO 14040 and ISO 14044 standards when applying an LCA.



Classification

Circuit-breaker switchgear type NXAIR H is factory-assembled, type-tested, metal-enclosed switchgear for indoor installation according to IEC 62271-200 and corresponds to the following classifications.

Loss of service continuity category and partition class

Loss of service continuity category	LSC 2B
Partition class	PM
Accessibility to compartments	
– Busbar compartment	Tool-based
– Switching-device compartment	Interlock-controlled
– Connection compartment	Interlock-controlled or tool-based

Internal arc classifications

The following internal arc classifications are fulfilled:
IAC A FLR, I_{SC} , t

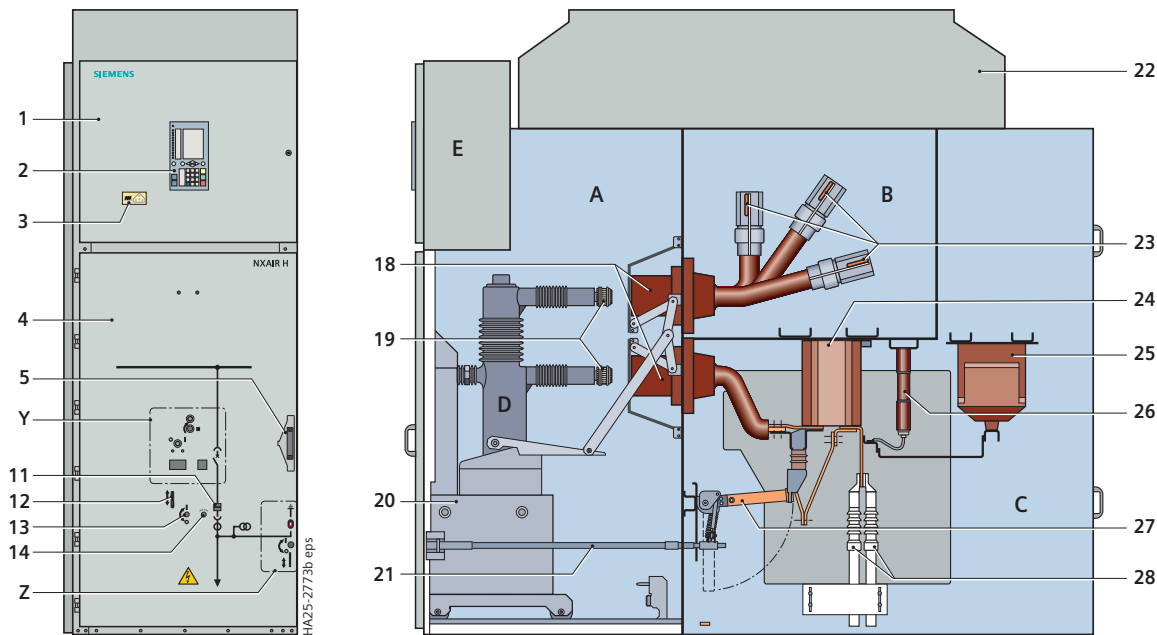
IAC	Internal arc classification
A	Distance between the indicators 300 mm, i.e. installation in rooms with access for authorized personnel only, closed electrical service location
F	Accessibility: Front arrangement of indicators for test
L	Accessibility: Lateral arrangement of indicators for test
R	Accessibility: Rear arrangement of indicators for test
I_{SC}	Test current for NXAIR H up to 31.5 kA
t	Arc duration 1 s

In this way, NXAIR H switchgear is suitable for unrestricted application (wall- or free-standing arrangement) in electrical service locations up to the maximum short-circuit ratings.

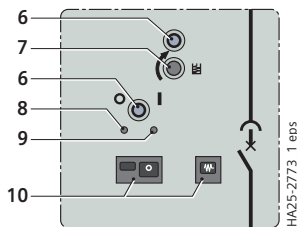
Design

Basic panel design

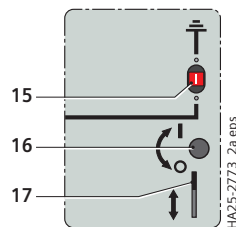
Basic panel design - circuit-breaker panel



Detail Y



Detail Z



Detail Y

- 6 Rotary button to close and open the actuating opening located below
- 7 Opening for charging the spring in the circuit-breaker manually
- 8 Actuating opening for opening the circuit-breaker
- 9 Actuating opening for closing the circuit-breaker
- 10 Inspection window to recognize the CLOSED-OPEN position indicator, spring state indicator, and operation counter of the circuit-breaker

Detail Z

- 15 Mechanical position indicator for feeder earthing switch
- 16 Actuating opening for feeder earthing switch
- 17 Operating slide for opening and closing the actuating opening for operating the feeder earthing switch

- 1 Door to low-voltage compartment
- 2 Protection device
- 3 Option: Voltage detecting system for feeder
- 4 High-voltage door
- 5 Handle for opening the high-voltage door

- 11 Mechanical position indicator for switching-device truck
- 12 Operating slide for opening and closing the actuating opening for racking the switching-device truck
- 13 Actuating opening for inserting the hand crank for racking the switching-device truck
- 14 Actuating opening for inserting the double-bit key to control racking of the switching-device truck

- 18 Bushing-type insulator
- 19 Contact system
- 20 Switching-device truck with operating and interlocking unit for racking the switching device
- 21 Operating mechanism for feeder earthing switch
- 22 Pressure relief duct for IAC 1 s
- 23 Busbar
- 24 Current transformer
- 25 Option: Fixed-mounted voltage transformer
- 26 Option: Surge arrester
- 27 Make-proof earthing switch
- 28 Cable connection

- A Switching-device compartment
- B Busbar compartment
- C Connection compartment
- D Vacuum circuit-breaker
- E Low-voltage compartment

Switching-device compartment

- All switching operations with high-voltage door closed
- Pressure relief upwards
- Panel front powder-coated with epoxy resin
- Standard color RAL 7035
- Metallic, earthed shutters ensure partition class PM
- High-voltage door pressure-resistant in the event of internal arcs in the panel
- Lateral metallic wiring duct for laying the control cables
- Switching-device compartment to accommodate components for implementing various panel versions with
 - Vacuum circuit-breaker truck
 - Disconnecter truck
 - Metering truck
- Endurance classes for
 - Circuit-breaker: E2, M2, C2
 - Isolating distance (withdrawable part): M0 manually for vacuum circuit-breaker truck.

Busbar compartment

- Pressure relief upwards
- Busbar made of flat copper, bolted from panel to panel
 - For rated continuous current of up to 2500 A
 - With insulation and shrouds at joints
- Bolted top covers provide tool-based access
- Top-mounted compartment above the busbar compartment within the pressure relief duct
- Separate pressure relief of the additional compartment via pressure relief flaps
- Options: Possibility of installing the following components (except for panels with natural or forced ventilation)
 - Voltage transformer
 - Make-proof earthing switch (endurance class: M0, E1), manually operated.

Connection compartment

- Pressure relief upwards through rear pressure relief duct
- Suitable for connection of single-core cables
- Earthing busbar
- Interlocked high-voltage door and switching-device compartment provide interlock controlled and tool-based access for panels with connection from rear
- Connection from front/bottom (wall-standing arrangement)
- Connection from front/bottom or rear (free-standing arrangement)
- Installation of block-type current transformers.

Components at the panel connection (option)

- Single-core XLPE cables
 - Quantity depending on the rated continuous current and other built-in components
- Coupling electrode for capacitive voltage detecting system
- Installation of voltage transformers
 - Cast-resin insulated
 - 3 × 1-pole
 - Fixed-mounted, without primary fuses
 - Or withdrawable with primary fuses
- Make-proof earthing switch
 - With manual operating mechanism
 - In addition to the standard interlock: Earthing switch optionally lockable or electromagnetically interlocked against the switching-device truck
- Endurance class for earthing switch: M0, E1
- Surge arresters
 - Protection of the switchgear against external overvoltages.

Design

Operation

Operation

Features

- Integrated mimic diagram
- Indication of the respective switch positions – circuit-breaker CLOSED/OPEN, disconnected position, earthing switch CLOSED/OPEN – on the integrated mimic diagram
- Unambiguous assignment of actuating openings and control elements to the corresponding position indicators
- All switching operations can only be performed with closed high-voltage door
- Ergonomically favorable height for all control and indicator elements
- Option: Verification of safe isolation from supply for feeder by means of the voltage detecting system with panel front closed.

Interlocks

- Interlocking conditions are satisfied according to IEC 62271-200
- Feeder earthing switch can only be operated with switching-device truck in test position
- Switching-device truck can only be racked with the associated switching device in OPEN position and with earthing switch OPEN
- Switching-device truck can only be operated in interlocked disconnected or service position.

Beyond the specifications of the standard

- The high-voltage door can only be opened when the switching-device truck is in test position
- Coding prevents insertion of switching devices with a lower rated continuous current into panels with a higher rated continuous current
- Option: Electromagnetic interlocking
- Option: Padlocks
- Mechanical key interlocking system.

Vacuum circuit-breaker

Features

- The vacuum circuit-breakers conform to the following standards:
 - IEC 62271-1
 - IEC 62271-100
- All circuit-breakers fulfill the endurance classes C2, E2, M2 and S1 according to IEC 62271-100, as well as the shortest rated operating sequence O – 0.3 s – CO – 15 s – CO.
Option: Rated operating sequence O – 0.3 s – CO – 3 min – CO
- Suitable for all switching duties
- Stored-energy spring mechanism with motor operation; manual operation always possible
- Racking the circuit-breaker with manual operating mechanism
- The vacuum circuit-breakers are maintenance-free:
 - Under normal ambient conditions according to IEC 62271-1
 - Up to 10,000 operating cycles, maintenance-free
 - No regreasing
 - No readjusting
- Embedded pole design
- 64-pole low-voltage plug connection between circuit-breaker and fixed part of the panel.

Switching-device truck

Features

- 6 NO + 6 NC auxiliary switch contacts at the carriage mechanism indicate the service and test position of the truck
- Interlocks to the panel door and the earthing switch are integrated in the operating mechanism box
- The truck is mechanically interlocked with the circuit-breaker
- 25 kA and 31.5 kA, with silver-plated tulip contacts.

Electrical data for	NXAIR H
Rated operating voltage	up to 36 kV
Rated short-circuit breaking current	up to 31.5 kA
Rated short-time withstand current	up to 31.5 kA/3 s
Rated short-circuit making current	up to 80/82 kA
Rated peak withstand current	up to 80/82 kA
Rated continuous current	up to 2500 A
Endurance class	E2, M2, C2



Vacuum circuit-breaker truck, front view



Vacuum circuit-breaker truck, rear view

Components

Current transformers according to IEC/EN 61869-1 and -2

Current transformer 4MA76

Features

- Inductive indoor support-type current transformer
- Block-type design
- According to IEC 61869-2
- Standardized
- Available worldwide
- Cast-resin insulated
- Insulation class E
- Narrow design according to DIN 42600 Part 8
- Secondary connection by means of screw-type terminals

Options

- With coupling electrode for voltage detecting systems
- Secondary multiratio possible

Mounting location

- Factory-assembled
- In the connection compartment.



Block-type current transformer up to 2500 A

Electrical data		Block-type current transformer
Rated operating voltage		up to 36 kV
Rated primary current		up to 2500 A
Rated frequency		50 Hz / 60 Hz
Rated short-time thermal current		up to 31.5 kA
Duration of short-time withstand current		1 or 3 s
Rated peak withstand current		up to 82 kA
Number of secondary cores		up to 3 nos.
Rated secondary current		1 or 5 A
Accuracy classes	Measuring	0.2 – 1 FS5/FS10
	Protection	1 5P/10P
Rating		up to 30 VA

Voltage transformer 4MR56

Features

- Inductive principle according to IEC 61869-3
- Cast-resin insulated, single-pole
- Insulation class E
- Secondary connection by means of screw-type terminals
- Standardized

Options

- With earth-fault winding
- Secondary multiratio possible

Mounting location

- Fixed-mounted block-type design without primary fuse in connection compartment
- Fixed-mounted block-type design without primary fuse in the additional compartment, at the busbar
- Withdrawable gun-type design with exchangeable primary fuse in connection compartment
- Metering truck in switching-device compartment.

Electrical data	Voltage transformer 4MR56, fixed-mounted	Voltage transformer 4MR56 +F23, withdrawable with primary fuse
Rated operating voltage	up to 36 kV	
Rated secondary voltage	up to 120 V or up to 120 V / $\sqrt{3}$	
Rated frequency	50 Hz/60 Hz	
Accuracy classes		
– Measuring	0.2/0.5/1.0	
– Protection	3P	
Rating	up to 100 VA	



Voltage transformer, fixed-mounted



Voltage transformer, withdrawable with primary fuse



Metering truck

Components

Low-voltage compartment

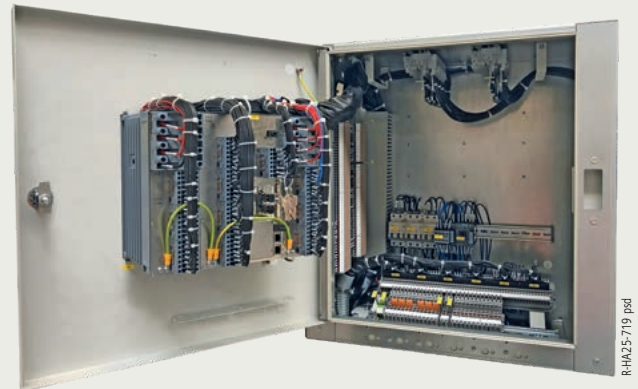
Low-voltage compartment

Features

- Low-voltage compartment for accommodation of all protection, control, measuring and metering equipment
- Partitioned safe-to-touch off the high-voltage part
- Low-voltage compartment can be removed, as all bus wires and control cables are plugged in
- Option: Higher low-voltage compartment
- Low-voltage cables are flexible and protected by metallic covers
- Connection between switching-device truck and panel wiring into low-voltage compartment via 10-pole, coded plug connections
- Bus wires are pluggable from panel to panel.



Door of low-voltage compartment (example)



Low-voltage compartment with built-in equipment (example)

Optical arc detection systems

Description

- Optical arc detection systems recognize internal arcs by means of optical sensors. This allows to detect arising internal arcs reliably and quickly. Accordingly, the protection device can trip quickly and without delay times.
- The internal arc is interrupted within 100 ms and prevents damage to the switchgear, which would otherwise occur due to the thermal phase of the internal arc.

Benefits

- Reliable detection of internal arcs
- Extremely fast break times ≤ 100 ms incl. the total break time of the circuit-breaker
- Clear reduction of the arc energy
- Minimization of thermal damage
- Increase of personal safety
- Minimization of downtimes
- EMC-safe thanks to purely optical sensors.

Design and function

- Basic components
 - Optical sensors in every compartment
 - Bay controller
 - Circuit-breaker
- Internal arcs are detected optically, almost without delays and by using an additional current criterion for preventing overfunctioning, e.g. due to external light
- Tripping of the circuit-breaker and interruption of the arc fault current within 100 ms.

Versions

Siemens SIPROTEC 5 with arc protection module

- Optical point sensors with optical fiber for signal transmission
- Line sensors in the busbar compartment possible as an option
- Arc protection module with three inputs for connection of optical point sensors or line sensors
- SIPROTEC 5 with protection function.

On request, selected optical arc detection systems can be installed as autonomous devices.



Bay controller of the SIPROTEC 5 series



Arc protection module ARC-CD-3FO



Point sensor with optical fiber and connection



Supply cable for line sensor with connection



Line sensor

Technical data

Electrical data

Electrical data

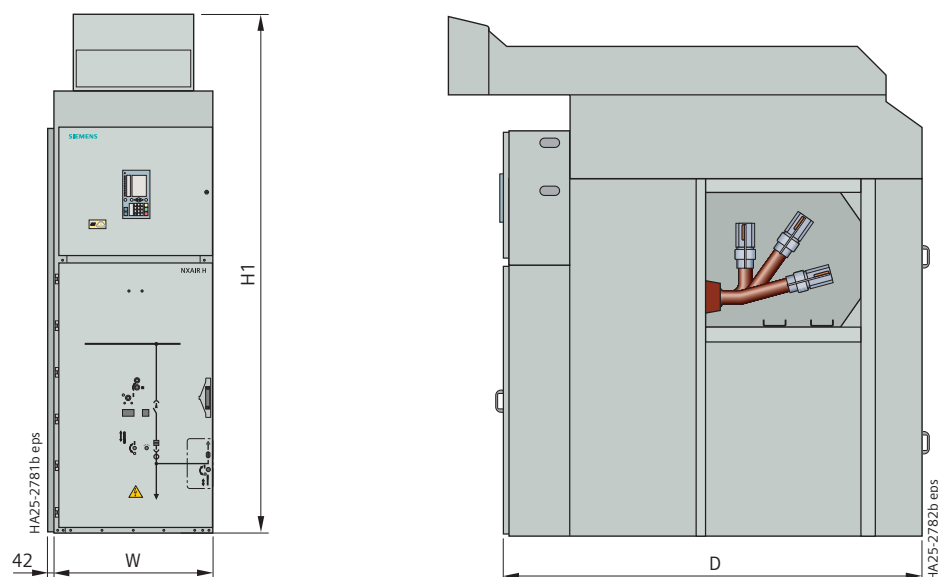
Rated values			
Rated voltage U_r	kV	36	
Rated frequency f_r	Hz	50/60	
Rated short-duration power-frequency withstand voltage U_d (phase-to-phase, phase-to-earth)			
	kV	70	
Rated lightning impulse withstand voltage U_p (phase-to-phase, phase-to-earth)			
	kV	170	
Rated short-circuit breaking current I_{sc}	max.	25	31.5
Rated short-time withstand current I_{kr} , 3 s	max.	25	31.5
Rated short-circuit making current I_{ma} (50 Hz)	max.	63	80
Rated short-circuit making current I_{ma} (60 Hz)	max.	65	82
Rated peak withstand current I_p (50 Hz)	max.	63	80
Rated peak withstand current I_p (60 Hz)	max.	65	82
Rated continuous current I_r ¹⁾			
– of busbar	max. A	2500	
– of feeders with disconnecter link	max. A	2500	
– of feeders with circuit-breakers	max. A	2500	
– of bus sectionalizer	max. A	2500	
Internal arc classification			
Rated voltage	kV	36	
Arc fault current	max. kA	31.5	
Arc fault duration	s	1	
Classification		A FLR	
Degree of protection			
Enclosure		IP4X	
Between the compartments		IP2X	
Loss of service continuity category			
Panel with circuit-breaker		LCS 2B	
Panel with disconnecter link		LCS 2B	
Panels without connection compartments are not assigned a loss of service continuity category according to IEC 62271-200.			
Partition class			
Panels in truck-type design	PM	Partitions made of metallic material	



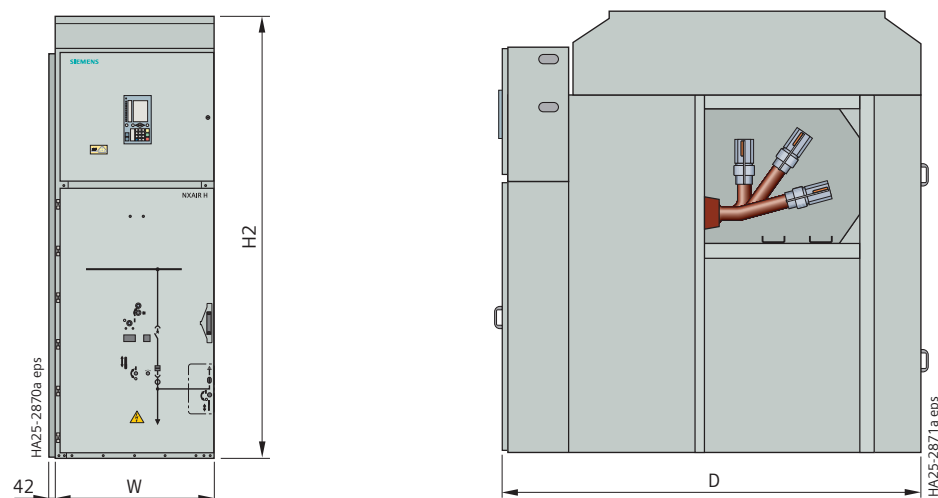
1) The rated continuous currents apply to ambient air temperatures of max. 40 °C.
The 24-hour mean value is max. 35 °C (according to IEC 62271-1)

Dimensions

Standard panel with pressure relief duct with exhaust



Standard panel with pressure relief duct closed



Dimensions

Width	W	Circuit-breaker panel	1000 mm
		Metering panel	1000 mm
		Disconnecting panel	1000 mm
		Bus sectionalizer	2 × 1000 mm
Height	H1	Standard panel with pressure relief duct with exhaust to relief gases into the switchgear room	3290 mm
	H2	Standard panel with pressure relief duct closed to relief gases out of the switchgear room	2800 mm
Depth ¹⁾	D	Standard panel free-standing and wall-standing, for IAC A FLR ≤ 31.5 kA/1 s	2670 mm

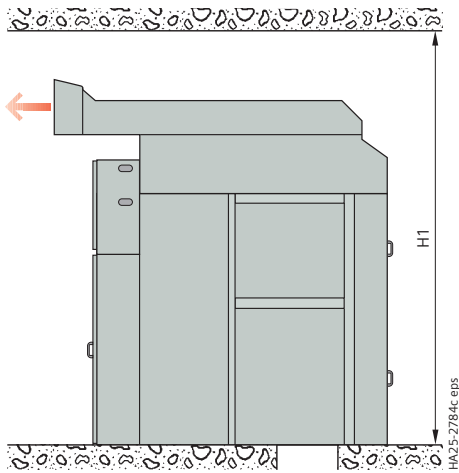
1) Depth depending on panel rating, number of cables, and built-in components in connection compartment

Technical data

Room planning

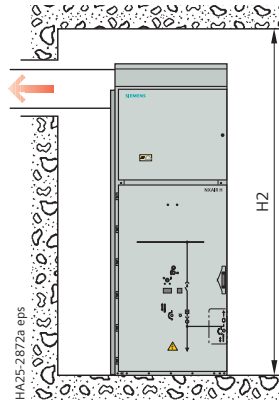
Room planning

Pressure relief into the switchgear room

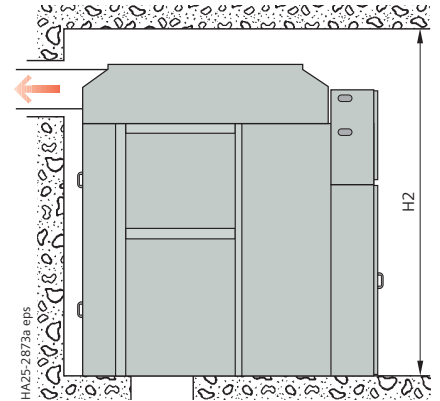


Through pressure relief duct with exhaust

Pressure relief out of the switchgear room



Lateral pressure relief duct



Rear pressure relief duct

Type of pressure relief

Pressure relief into the switchgear room through pressure relief duct with exhaust

H1

Ceiling height H at short-time withstand current ≤ 31.5 kA

≥ 3600 mm

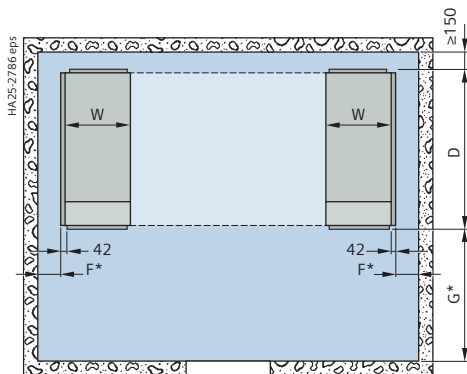
Pressure relief out of the switchgear room through pressure relief duct closed ¹⁾

H2

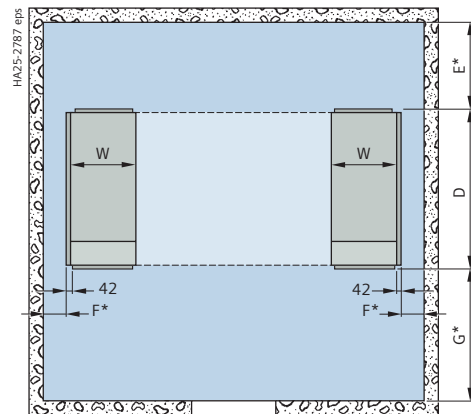
≥ 3000 mm

1) For designs with a closed pressure relief duct to the outside, a distance of ≥ 500 mm is required on this side for installation.

Type of installation



Plan view (wall-standing arrangement)



Plan view (free-standing arrangement)

Dimensions of switchgear room

Distances	Rear wall distance, cable connection from front	
	Rear wall distance, cable connection from rear-bottom or from front	E*
	Rear wall distance for withdrawable voltage transformers accessible with cable connection from rear-bottom	E*
	Lateral wall distance	F*
Control aisle	For replacement of switching devices	G*
	For panel replacement	G*

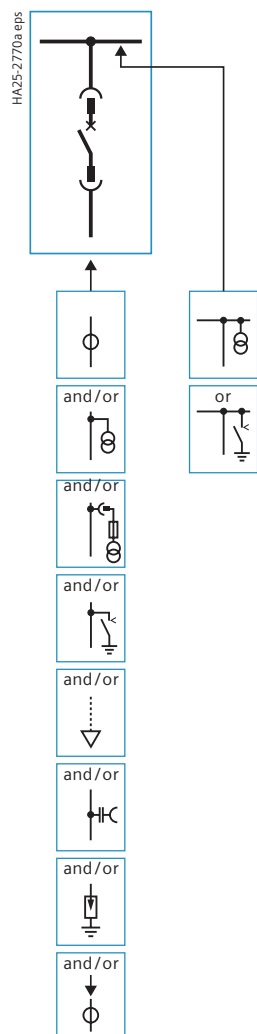
All dimensions are in mm

Wall-standing	≥ 150
Free-standing	≥ 800 ²⁾
Free-standing	≥ 1200
	≥ 200 ³⁾
	≥ 1800
	≥ 3000

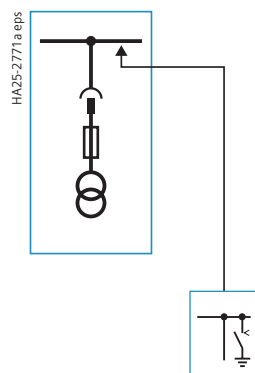
2) Rear wall distances
 ≥ 500 mm for installation and maintenance acc. to IEC 61936-1
 ≥ 800 mm aisle for operation acc. to IEC 62271-200

3) A distance of ≥ 1000 mm is required in case of withdrawable voltage transformers accessible from rear

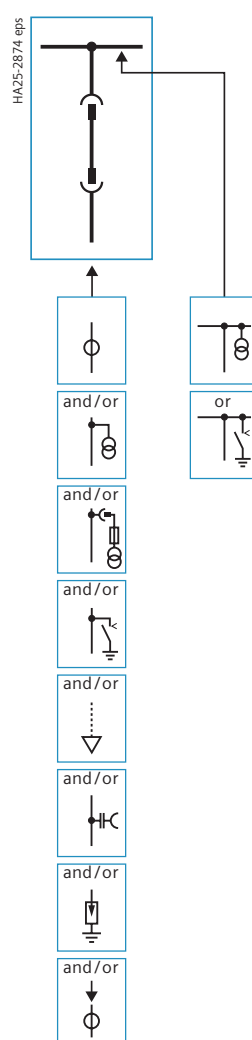
Circuit-breaker panel



Metering panel



Disconnecting panel



Current transformer



Voltage transformer



Vacuum circuit-breaker



Withdrawable voltage transformers with primary fuses



Make-proof earthing switch



Capacitive voltage detecting system



Cable connection



Surge arrester



CBCT



Disconnecter link

Technical data

Product range



Current transformer



Voltage transformer



Vacuum circuit-breaker



Withdrawable
voltage transformers
with primary fuses

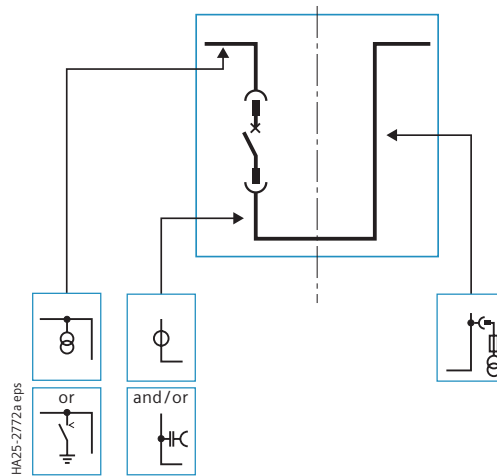


Make-proof earthing
switch



Capacitive voltage
detecting system

Bus sectionalizer



Type of service location

The switchgear can be used as indoor installation according to IEC 61936-1 (Power Installations exceeding 1 kV AC):

- Outside lockable electrical service locations at places which are not accessible to the public. Enclosures of switchgear can only be removed with tools
- In lockable electrical service locations. A lockable electrical service location is a place outdoors or indoors that is reserved exclusively for housing electrical equipment and which is kept under lock and key. Access is restricted to authorized personnel and persons who have been properly instructed in electrical engineering. Untrained or unskilled persons may only enter under the supervision of authorized personnel or properly instructed persons.

Dielectric strength

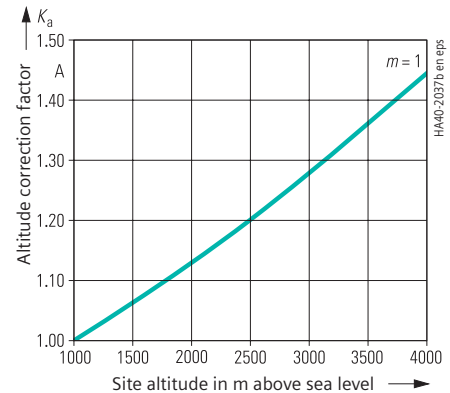
- The dielectric strength is verified by testing the switchgear with rated values of short-duration power-frequency withstand voltage and lightning impulse withstand voltage according to IEC 62271-1 (see "Table for dielectric strength").
- The rated values are referred to sea level and to normal atmospheric conditions (1013 hPa, 20 °C, 11 g/m³ humidity in accordance with IEC 60071).
- The dielectric strength decreases with increasing altitude. For site altitudes above 1000 m (above sea level), the standards do not provide any guidelines for the insulation rating. Instead, special regulations apply to these altitudes.
- Site altitude
 - The dielectric strength of air insulation decreases with increasing altitude due to low air density. This reduction is permitted up to a site altitude of 1000 m according to IEC.
 - For site altitudes above 1000 m, a higher insulation level must be selected. It results from the multiplication of the rated insulation level for 0 to 1000 m with the altitude correction factor K_a .

Table for dielectric strength

Rated voltage (r.m.s. value)	kV	36
Rated short-duration power-frequency withstand voltage (r.m.s. value)		
– Between phases and to earth	kV	70
Rated lightning impulse withstand voltage (peak value)		
– Between phases and to earth	kV	170

Altitude correction factor K_a

For site altitudes above 1000 m, the altitude correction factor K_a is recommended, depending on the actual site altitude above sea level.



Rated short-duration power-frequency withstand voltage to be selected for site altitudes > 1000 m

\geq Rated short-duration power-frequency withstand voltage up to $\leq 1000 \text{ m} \cdot K_a$

Rated lightning impulse withstand voltage to be selected for site altitudes > 1000 m

\geq Rated lightning impulse withstand voltage up to $\leq 1000 \text{ m} \cdot K_a$

Example:

3000 m site altitude above sea level,
24 kV switchgear rated voltage,
125 kV rated lightning impulse withstand voltage

Rated lightning impulse withstand voltage to be selected
 $125 \text{ kV} \cdot 1.28 = 160 \text{ kV}$

Result:

According to the above table, switchgear for a rated voltage of 36 kV with a rated lightning impulse withstand voltage of 170 kV is to be selected.

Standards

Standards, specifications, guidelines

		IEC standard / EN standard	Title
Switchgear		62271-1	High-voltage switchgear and controlgear: Common specifications for alternating current switchgear and controlgear
		62271-200	High-voltage switchgear and controlgear: AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV
Switching devices	Circuit-breakers	62271-100	High-voltage switchgear and controlgear: Alternating-current circuit-breakers
	Disconnectors and earthing switches	62271-102	High-voltage switchgear and controlgear: Alternating current disconnectors and earthing switches
	Switch-disconnectors	62271-103	High-voltage switchgear and controlgear: Switches for rated voltages above 1 kV up to and including 52 kV
Voltage detecting systems		62271-213	Voltage detecting and indicating system (VDIS)
		62271-215	Phase comparator used with VDIS
HV HRC fuses		60282-1	High-voltage fuses: Current-limiting fuses
Surge arresters		60099-4	Surge arresters
Degree of protection		60529	Degrees of protection provided by enclosures (IP code)
		62262	Degree of protection provided by enclosures (IK code)
Insulation		60071	Insulation co-ordination
Instrument transformers		61869-1	Instrument transformers
		61869-2	Current transformers
		61869-3	Voltage transformers
		61869-6	Low-power instrument transformers
		61869-10	Low-power passive current transformers
		61869-11	Low-power passive voltage transformers
Installation		61936-1	Power installations exceeding 1 kV a.c.
Environmental conditions		60721-3-3	Classification of environmental conditions
Operation		EN 50110	Operation of electrical installations

Standards

The switchgear complies with the relevant standards and specifications applicable at the time of type tests.

In accordance with the harmonization agreement reached by the countries of the European Union, their national specifications conform to the IEC standard.

Current-carrying capacity

- According to IEC 62271-200 or IEC 62271-1, the rated continuous current refers to the following ambient air temperatures:
 - Maximum of 24-hour mean + 35 °C
 - Maximum + 40 °C
- The current-carrying capacity of the panels and busbars depends on the ambient air temperature outside the enclosure.

Internal arc classifications

- Protection of operating personnel by means of tests for verifying the internal arc classification
- Internal arcing tests must be performed in accordance with IEC 62271-200
- Definition of criteria:
 - Criterion 1: Correctly secured doors and covers do not open, limited deformations are accepted
 - Criterion 2: No fragmentation of the enclosure, no projection of small parts above 60 g
 - Criterion 3: No holes in accessible sides up to a height of 2 m
 - Criterion 4: No ignition of indicators due to hot gases
 - Criterion 5: The enclosure remains connected to its earthing point
- NXAIR H complies with the internal arc classification IAC A FLR up to 31.5 kA/1 s, providing for maximum personal safety.

Climate and ambient conditions

The NXAIR H switchgear is suitable for application in indoor installations under normal operating conditions as defined in the standard IEC 62271-1.

- Operating temperature range –5 °C to +55 °C (for primary part)
- Rel. air humidity
 - Mean value over 24 h¹⁾: ≤ 95 %
 - Mean value over 1 month: ≤ 90 %
- Condensation
 - Occasionally
 - Frequently (degree of protection min. IP4X, with anti-condensation heater²⁾)
- Site altitude
 - Observe altitude correction (see page 25)
- No significant pollution of the ambient air (dust, gases, vapors, salts).

Recycling

The switchgear can be recycled in ecological manner in compliance with existing legislation. Auxiliary devices such as short-circuit indicators have to be recycled as electronic scrap. Batteries have to be recycled professionally.

Terms

“Make-proof earthing switches” are earthing switches with short-circuit making capacity according to IEC 62271-102.

Protection against solid foreign objects, electric shock, and water

NXAIR H switchgear fulfills according to the standards

IEC 62271-1	EN 62271-1
IEC 62271-200	EN 62271-200
IEC 60529	EN 60529
IEC 62262	EN 50102

the following degrees of protection:

Panel	NXAIR H
Degree of protection for the enclosure, optionally	IP4X
Degree of protection for the enclosure, with ventilation	IP4X
Degree of protection for the partitions	IP2X
Degree of protection for the enclosure against mechanical impacts from outside	IK07

For secondary devices in the low-voltage door, the stipulations of the IP degree of protection apply according to the definitions for the switchgear enclosure.

Color of the panel front

RAL 7035 (light gray).

Seismic withstand capability (option)

NXAIR H switchgear can be upgraded for regions at risk from earthquakes. For this upgrade, earthquake qualification testing has been carried out in accordance with the following standards:

- IEC 62271-207 “Seismic qualification for gas-insulated switchgear assemblies, metal enclosed and solid-insulation enclosed switchgear for rated voltages above 1 kV”
- IEC 60068-3-3 “Guidance – seismic test methods for equipment”
- IEC 60068-2-57 “Test Ff: Vibration – Time-history method”
- IEC 60068-2-6 “Environmental testing – Part 2–6: Test Fc: Vibration (sinusoidal)”
- IEEE 693-2005 “Recommended Practice for Seismic Design of Substations”.

For installation on even and rigid concrete or steel structure (without considering building influences), the tested ground accelerations meet the following requirements:

- Uniform Building Code 1997 (UBC) – Zone 4
- IEEE 693-2005 – High required response spectrum (Fig. A.1).

¹⁾ Secondary devices (e.g. protection devices, meters, measuring transducers, etc.) must be suitable for the given operating conditions

²⁾ Heater is optionally available in the low-voltage compartment, switching-device compartment, and connection compartment

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Medium-
Voltage
Switchgear



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Smart Infrastructure
Electrification & Automation
Mozartstrasse 31c
91052 Erlangen, Germany

For further information please contact
our Customer Support Center:
Phone: +49 9131 1743072
E-mail: support.ea.si@siemens.com
[siemens.com/medium-voltage-switchgear](https://www.siemens.com/medium-voltage-switchgear)
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